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RESPIRATORY PROTECTION	Document	TFC-ESHQ-S_IH-C-05, REV E-16
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[Ownership matrix](#)

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1.0 PURPOSE AND SCOPE

(7.1.1, 7.1.2, 7.1.3, 7.1.5)

This procedure establishes the requirements and practices for the purchase, storage, use, maintenance, issue, and control of respirators. The practices and controls stated in this procedure reflect the requirements defined in the Code of Federal Regulations (CFR) 1910.134 and ANSI Z88.2.

This procedure applies to work activities and personnel under the control of the Tank Farm Contractor (TFC) and its subcontractors. Respiratory protection criteria unique to substance specific Occupational Safety and Health Administration (OSHA) standards are not included in this procedure. This procedure does not address methodologies or protocols used in exposure monitoring to determine respiratory hazards, nor does it detail the work control and problem identification processes that interface with respiratory protection issues. Supplemental guidance on issuance and control of respirators is provided in [TFC-ESHQ-S_IH-CD-05.1](#).

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

3.0 RESPONSIBILITIES

3.1 Environmental Health

1. Serves as the functional area manager and technical authority for the respiratory protection program.
2. Provides oversight of this procedure.
3. Formally designates a qualified respiratory protection program administrator within the safety and health department to administer the respiratory protection program, and serves as the focal point for respiratory protection problem resolution. (7.1.2)

3.2 Industrial Hygienists and Health Physicists

1. Ensure that proper respiratory protection equipment is issued as prescribed.
2. Provide respiratory technical service for each area of expertise: Health Physicists will identify and evaluate radiological airborne hazards and Industrial Hygienists will identify and evaluate non-radiological airborne hazards.

3.3 Respiratory Protection Core Team

A Respiratory Protection Core Team shall be formed to:

- Evaluate the effectiveness of the respiratory protection program
- Identify and recommend solutions to respiratory protection program issues
- Identify and recommend improvements to the respiratory protection program
- [Review and discuss new models, types, configurations, or applications of respiratory protection equipment and make recommendations prior to being approved for purchase or use.](#)

The Respiratory Protection Core Team shall include:

- Senior management sponsor
- Management representative
- First line manager
- Administrative person
- Industrial Hygienist/IH Technician
- Respirator Issuer
- Hanford Fire Department
- Safety Engineer
- [RadCon Health Representative](#).

The Respiratory Protection Core Team shall meet as often as necessary.

4.0 PROCEDURE

4.1 Purchase, Control, and Storage of Respiratory Protection Equipment

See [Figure 1](#) for process flowchart.

- | | |
|--------------|---|
| Line Manager | <ol style="list-style-type: none"> 1. Obtain respiratory protection program administrator approval for all respiratory protection equipment purchases. 2. Establish a controlled distribution point for the proper storage, issue, and return of respirators and associated respiratory protection equipment. See Table 1 for locations of mask issuing stations. 3. Designate a respirator issuer to control the custody and integrity of respirators. See Table 1 for a point of contact for each mask issuing station. 4. Ensure the respirator issuer is informed of the types and quantities of respiratory protection equipment required for the project. 5. Ensure emergency respirators (self-contained breathing apparatus (SCBAs)) are stored properly. <ul style="list-style-type: none"> • Emergency respirators must be kept accessible to the work area and stored in compartments or in covers that are clearly marked as containing emergency respirators. • Emergency respirators staged for emergency use (in storage containers) must be inspected monthly (see Section 4.10) and contain one of each size of respirator facepiece. • Emergency respirators will not be considered staged for emergency use until they are fully assembled, properly inspected, and available within the appropriate storage container. |
|--------------|---|

NOTE: Emergency respirators may not be used in lieu of other respirators (i.e., air purifying respirators, powered-air

purifying respirators); they may only be used when required by procedure or when prescribed by Industrial Hygiene and Radiological Control.

Deleted: or

Respiratory Protection Program Administrator

6. Specify respirators to be purchased.

7. Review and approve purchase orders for any new models, types, configurations, or applications of respiratory protection equipment.

Deleted: or

Designated Industrial Hygienists and Health Physicists

Deleted: /

Respirator Issuer 8. Maintain control of respirators:

- a. Keep them secure to prevent unauthorized use.
- b. Track respirator receipt, issuance, and return.

Respirator Issuer/User 9. Store respirators and associated respiratory equipment properly.

- a. Store respirators in a manner to prevent deformation of the facepiece and exhalation valve.
- b. Store respiratory equipment in a manner that provides protection from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Do not leave respirators lying on shelves, tabletops, inside vehicles, or hanging on protrusions from equipment or walls.

NOTE: Users are responsible for the proper storage of respirators and equipment during the period that the respirator is assigned to them. The approved storage location for SCBAs when workers are taking a break is in the change trailer with an attendant.

10. Periodically verify inventory and integrity of stored respirators and maintain appropriate levels of stock in the distribution area.
11. Never make additions, adjustments, or modifications to any respiratory equipment that will effect that equipment's National Institute for Occupational Safety and Health approval for form, fit, or function (e.g., altering the low pressure alarm on SCBA units).

4.2 Cleaning and Maintenance of Respiratory Protection Equipment

(7.1.2.a)

Line Manager 1. Provide respirator users respirators that are clean, sanitary, and in good working order.

NOTE: Cleaning, disinfecting, and maintenance of respirators will be performed by an approved vendor. Maintenance and testing of 3M[®] Breathe Easy and MSA OptimAir 6A Powered Air Purifying Respirators is performed by industrial hygiene/respiratory protection technicians in accordance with [TFC-ESHQ-S_IH-D-05.2](#).

Respirator Issuer 2. Coordinate the cleaning and maintenance of used respiratory protection equipment after each use to ensure clean, sanitary, and properly operating respiratory protection equipment is available for respirator users. (7.1.2)

Respirator User 3. If a respirator requires maintenance other than normal cleaning, return it and inform the issuer about the maintenance required.

4.3 Medical Evaluations

See [Figure 2](#) for process flowchart.

Environmental Health Department 1. Communicate the following information to the medical evaluator so an accurate assessment of employees' ability to perform duties can be made:

- The type and weight of the respiratory equipment
- The duration and frequency of the respirator use
- The expected physical work effort
- Additional protective clothing and equipment
- Temperature and humidity extremes that may be encountered.

Supervisors/Managers 2. Ensure employees receive initial medical evaluations and written notification of their clearance from the medical provider before wearing a respirator. Enrollment into medical surveillance is documented as required by the employee job task analysis ([TFC-ESHQ-S_IH-C-17](#)).

NOTE: Medical surveillance is not required for employees who will only wear filtering facepiece respirators (dust masks), as long as the dust mask is not used in conditions where the OSHA permissible exposure limit (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) for nuisance dusts may be exceeded. Industrial Hygiene determines acceptable use conditions.

3. Ensure employees have respirator mask glasses, as needed ([A-6003-769](#)).
4. Ensure respirator wearers receive an annual medical examination to maintain their qualifications to wear a respirator.
5. Ensure additional medical evaluations are provided if:
 - The employee reports medical signs or symptoms related to the ability to use a respirator, or
 - A change occurs in work place conditions (such as physical work effort, protective clothing, and temperature) that may result in substantial physiological burden.

NOTE: A worker can be provided a PAPR if they cannot wear a negative pressure respirator due to a medical condition and the medical

opinion indicates they can wear a PAPR.

4.4 Training

See [Figure 2](#) for process flowchart.

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| Supervisors/Managers | <ol style="list-style-type: none"> 1. Ensure respirator wearers receive appropriate respirator training in accordance with 29 CFR 1910.134(k). 2. Ensure respirator issuers and supervisors of respirator wearers understand their responsibilities as described in this procedure. 3. Ensure employees receive appropriate respirator refresher training. |
| Training Coordinators | <ol style="list-style-type: none"> 4. Schedule respirator wearers for applicable training for their job responsibilities. |

4.5 Fit Testing

See [Figure 2](#) for process flowchart.

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| Respiratory Protection Program Administrator | <ol style="list-style-type: none"> 1. Review fit test protocols used by the TFC or its subcontractors to ensure the protocols are OSHA accepted. |
| Supervisors/Managers | <ol style="list-style-type: none"> 2. Ensure employees have been properly fit tested for the respirator(s) they will be using: <ul style="list-style-type: none"> • Prior to the initial use of a respirator • Whenever a different respirator facepiece (size, style, model, or make) is used • At least annually thereafter. <p>NOTE: Mask fit is not required for employees who will only wear filtering facepiece respirators (dust masks) as long as the dust mask is not used in conditions where the OSHA PEL or ACGIH TLV for nuisance dusts may be exceeded. Industrial Hygiene determines acceptable use conditions.</p> 3. If an employee needs to wear a respirator that he/she has not been currently fit tested for, arrange for additional fit testing through the fit test station before use of the respirator. |
| Respirator User | <ol style="list-style-type: none"> 4. Perform negative and positive pressure fit checks of all tight fitting facepiece respirators, regardless of whether they are in the positive or negative pressure mode of operation, prior to using the respirator. 5. Ensure that facial hair does not interfere with respirator fit. |

6. Notify the supervisor/manager when physical changes occur that would warrant another fit test, such as the following:

- A weight change of 20 pounds or more, or more than 10% of total body weight
- Significant facial scarring in the area of the facepiece seal
- Significant dental changes such as multiple extractions without prosthesis or acquiring dentures
- Reconstructive or cosmetic surgery
- Body piercings that may interfere with the sealing area of a respirator

NOTE: Body piercing devices may become dislodged during doffing of a respiratory, which could potentially cause an open wound in a radiologically controlled area. Body piercing devices that are located in or near the sealing area of a respirator should be removed prior to donning a respirator as respirator users must have a good fit at all times while wearing a respirator.

- Any other condition that may interfere with facepiece sealing or donning/doffing of respiratory equipment.

7. Inform the supervisor/manager of any improperly fitting respirators or any problems with the respiratory protection equipment that may affect the fit or operation of the respirator.

Supervisors/Managers

8. If the employee notifies the supervisor/manager that the fit of the respirator is unacceptable, give the employee an opportunity to select a different respirator facepiece and to be retested.
9. Ensure that an additional fit test is conducted whenever the employee reports, or it is observed, that changes in the employee's physical condition could affect respirator fit.

NOTE: Additional fit tests may be requested by the company or medical contractor.

4.6 Exposure Assessments and Selection of Respirators (7.1.1)

See [Figure 3](#) for process flowchart.

Industrial Hygienists/
Health Physicists

1. Identify the potential airborne contaminants and potential employee exposure levels.

NOTE: An evaluation of the respiratory hazards in the workplace must be performed to provide data for the selection of respiratory protection.

2. Provide an identification of the contaminant(s), including chemical state and physical form.
3. Provide a reasonable estimate of employee exposures to the respiratory hazards. As appropriate, qualitatively estimate or quantitatively measure exposure during the planning, initial implementation, and conduct of jobs and tasks.
4. If the contaminant(s) cannot be identified, and/or a reasonable estimate of the employee exposure to the respiratory hazard cannot be provided, document the atmospheric condition as Immediately Dangerous to Life or Health (IDLH).
5. If the hazard evaluation indicates the potential for exposure above the permissible exposure limit/threshold limit value, and engineering or administrative controls are not feasible or may not be successful in lowering exposure to below applicable limit, select appropriate respiratory protection based on the factors listed below:

NOTE: Select only respirators certified by the National Institute for Occupational Safety and Health (NIOSH). Specific guidance for respirator selection is available from NIOSH and OSHA. (7.1.4)

- Characteristics of the hazardous agent
- Anticipated level of exposure relative to the permissible exposure limit/threshold limit value
- Relative stability of the exposure
- Possibility of a sudden release of the agent or engulfment
- Potential for an IDLH atmosphere
- Potential for an oxygen deficient or depleted atmosphere
- Warning properties of the agent
- Availability of monitoring to detect the agent in a timely fashion and take appropriate mitigating action

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- Assigned protection factor of the respirator ([Attachment A](#) identifies the protection factors used by the TFC and its subcontractors)
- Other work place and user factors, such as confined space entry, visibility, stress, individual comfort, and protection of the employee's skin and eyes.

NOTE: Hooded supplied-air respirators (bubble suits) are not acceptable for IDLH or oxygen deficient atmospheres.

6. When radiological and non-radiological hazards exist requiring respiratory protection, collaborate on selecting the appropriate respiratory protection to ensure protection against the combined hazards.
7. Prescribe single-use dust masks only for nuisance dusts below the applicable occupational exposure limit. Single-use dust masks will not be used to protect against:
 - Nuisance dusts above the exposure limit
 - Toxic dusts at any level
 - Mists, vapors, or gases at any level
 - Asbestos fibers at any level
 - As a substitute for the use of acceptable respiratory protection.

8. Document the potential chemical hazards and expected concentrations, if known, and the respirator type (and cartridge, if applicable) to be used, on the hazard analysis ([TFC-ESHQ-S_SAF-C-02](#)).

NOTE: As allowed by work control processes, other documents may be used to prescribe respiratory protection, such as radiological work permits, work packages, procedures, written recommendations from Industrial Hygiene, or other work control documents or permits ([TFC-OPS-MAINT-C-01](#)).

9. If gas/vapor cartridges are required, develop cartridge or canister change-out schedules and document on a work document.

NOTE: A cartridge or canister change-out schedule must be implemented when using air-purifying respirators that are not equipped with an end-of-service-life indicator certified by NIOSH for the gas/vapor being guarded against. A default cartridge or canister change-out schedule is provided in [Attachment B](#) and guidelines for establishing cartridge or canister change-out schedules are provided in [Attachment C](#).

4.7 Issuance, Use, and Return of Respiratory Protection Equipment

See [Figure 4](#) for process flowchart.

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| Supervisors/Managers | <ol style="list-style-type: none"> 1. Ensure that work control documents clearly identify the types of respiratory protection equipment to be used for work sites and activities, and that respirator issuers have full and convenient access to these documents. 2. Notify the respirator issuer of the types of respirators selected for use and its purpose (TFC-OPS-MAINT-C-02). See Table 1 for a list of mask issuing stations and the appropriate point of contact. |
| Respirator User | <ol style="list-style-type: none"> 3. Be knowledgeable of the respiratory protection to be used for the work to be performed and know why the respiratory protection is required. <p>NOTE: Mask glasses are available through form A-6003-769.</p> |
| Respirator Issuer | <ol style="list-style-type: none"> 4. Prior to issuing respirators, verify that the wearer has a current fit test card and training document. <p>NOTE: The issuer should note any body piercing devices present in the facepiece sealing area of the employee requesting a respirator as these devices may interfere with the seal of a respirator. If such devices are present, the issuer needs to instruct the employee to remove the device prior to donning a respirator.</p> |
| Respirator User/
Respiratory Issuer | <ol style="list-style-type: none"> 5. When the ambient temperature is 32 degrees Fahrenheit or below a full-face piece respirator is required to be equipped with a nose cup. |
| Respirator User | <ol style="list-style-type: none"> 6. If fogging cannot be alleviated or personnel safety is at risk for any reason that is aggravated by wearing a mask, remove the mask and immediately proceed to the nearest tank farm exit. <p>NOTE: To reduce fogging of the face piece it may be treated with commercial products designed to inhibit fogging and/or by using a respirator equipped with a nose cup.</p> |
| | <ol style="list-style-type: none"> 7. Maintain current authorization to wear a respirator: <ol style="list-style-type: none"> a. Maintain up-to-date training, fit testing, and medical clearance. b. Maintain facial hair and body piercing devices in a manner that does not interfere with the respirator facepiece sealing surface. 8. Present the respirator fit test card when requesting a respirator from the respirator issuer. |

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| Respirator Issuer | <p>9. Issue respirators:</p> <ul style="list-style-type: none"> • Only to authorized wearers (employees with appropriate medical clearance, training, and fit testing) • Only when facial hair or body piercing devices do not interfere with the seal on a respirator facepiece • Only when the individual has been qualified by training and fit testing, and approved to use, as indicated on the respiratory fit test card. <p>NOTE: Bulk respiratory equipment may be checked out and issued to a group in the field if the person checking out the equipment is a qualified issuer, fit test cards and respirator training are verified for each user, and a copy of the sign out sheet is completed and returned to the issuing station.</p> |
| Supervisors/
Managers/Respirator User | <p>10. Ensure correct protection for the job has been received in accordance with the work documentation.</p> <p>11. Complete the respiratory equipment sign out/sign in log (Figure 5) for APR, SCBA, and supplied air and Figure 6 for PAPR to verify there are no radiological or medical work restrictions and the correct respiratory protection was received.</p> |
| Respirator Issuer | <p>12. Complete applicable portions on the respiratory equipment or PAPR sign out/sign in log.</p> <p>NOTE: Indicate an N/A in the appropriate spaces on the log for disposable respiratory protection equipment.</p> |
| Respirator Issuer | <p>13. Issue respirator.</p> |
| Respirator Issuer,
Respirator User | <ul style="list-style-type: none"> • Respirators shall be used for a maximum duration of up to two consecutive shifts • Radiological release procedures apply to respirators used strictly for protection in air monitoring zones • New respirator cartridges must be obtained when cartridges cannot be radiologically released • New respirators may have to be obtained if radiological release cannot be obtained, especially on back shifts • If daily return is impractical, contact the Respiratory Protection program administrator or safety management to establish alternate return cycles. |
| Respirator User | <p>14. Inspect each respirator prior to use to ensure that it is the proper model and size respirator and is in proper working condition. (7.1.2)</p> |

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15. Don SCBA/airline respirators in accordance with [Attachment D](#).
16. Conduct a positive and negative pressure fit check each time an air-purifying respirator is donned or adjusted. Refer to [Attachment E](#) for user seal check details.
17. Strictly follow the cartridge or canister change-out schedule developed for the activities being performed, as applicable.
18. Watch co-worker(s) for signs of heat stress and fatigue during respirator use. Assist claustrophobic co-workers when exiting respirator use areas.
19. Leave the respirator use area immediately if breakthrough of vapor or gas is detected, changes in breathing resistance, or leakage of facepiece.

NOTE: Immediately report any gas or vapor breakthrough to the supervisor and Industrial Hygiene personnel.

20. Doff SCBA/airline respirators in accordance with [Attachment D](#).

Field Work
Supervisor

21. If a failure or abnormal operation occurs, ensure the affected individuals are placed in a safe location, notify the on-duty Shift Manager, and refer to [Attachment F](#) for additional actions.

Radiological Control

22. Perform radiological contamination surveys of respiratory protection devices removed from contamination, high contamination, or airborne radioactivity areas.

Operations

23. If respiratory protection devices are found to be radiologically contaminated, attempt minor decontamination at the exit point.
24. If respiratory protection devices cannot be decontaminated, handle the devices according to applicable waste handling and packaging procedures ([TO-100-052](#)).

NOTE: Released respiratory protection devices shall be returned to the issuing station by the respirator user.

Respirator User

25. Return respirator equipment to the mask station from where it was issued or contact the mask issuing station if the respirator units cannot be returned by the end of the shift.
26. Promptly report any skin irritation, which may be caused by respirator use, to the supervisor and Industrial Hygiene personnel.
27. Notify the on-duty respirator issuer if the respirator cannot be returned due to disposal or loss of equipment.

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| Respirator User/
Respirator Issuer | 28. | <p>Notify the on-duty respirator issuer of any blood or vomit that may be present in the mask or rack, if appropriate.</p> <p>NOTE: Do not place the mask in the general return bin.</p> <ol style="list-style-type: none"> a. Have the issuer hold open a biohazard bag and place the mask/racks into the bag. Tape the bag closed. b. Separate biohazard bag from returned equipment. c. Contact the Safety Programs group for assistance. |
| Respirator Issuer | 29. | Retrieve issued respirators that have not been returned, as specified, or that are not properly maintained by the wearer. |
| Respiratory User/
Issuer | 30. | Complete the applicable portions of the respiratory equipment sign out/sign in log. Note if respiratory protection devices could not be returned due to disposal or loss. |

4.8 Review Respiratory Equipment Sign Out/Sign In Log

See [Figures 5](#) and [6](#) for minimum data requirements.

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| Respirator Issuer | 1. | Review the log at the end of each shift or at the end of each job. |
| | 2. | Notify the Operations manager of any incomplete entries. |
| | 3. | Perform periodic inspections of step-off pad locations for unreturned respiratory protection devices. |
| | 4. | If unreturned respirators are found in radiological areas, submit a problem evaluation request (TFC-ESHQ-Q C-C-01). |

4.9 Package and Return Used Respiratory Protection Devices

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| Respirator Issuer | 1. | Package used respiratory protection devices for return to the contracted vendor for cleaning. |
| | 2. | Verify contaminated respiratory protection devices are properly packaged and labeled with identification of contaminants found on the respirators, such as radioactive materials, asbestos, lead, or mercury. |
| | 3. | Return respiratory protection devices in accordance with contracted vendor requirements to the vendor for cleaning. |
| | | NOTE: The return of SCBA/supplied air respiratory protection devices is covered in the following section. |
| | 4. | Dispose of air-fed hoods in accordance with applicable waste handling procedures. |

4.10 Monthly Inspections of Self-Contained Breathing Apparatus

(7.1.2.a, 7.1.2.b, 7.1.2.c)

See [Figure 7](#) for process flowchart.

Monthly inspections to ensure proper function are required for all Scott 4.5 SCBAs staged for immediate emergency use. (7.1.2) Using a test cylinder for performing the air supply system inspection is the preferred method; however, the actual emergency cylinder may be used provided it remains in the full specification defined in step 9.

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| Line Manager | 1. Assign facility/SCBA qualified personnel to complete and document monthly SCBA inspections. |
| SCBA Inspector | 2. Visually inspect the complete SCBA unit for worn or aging rubber parts, worn or frayed harness webbing, or damaged components.

3. Check the latest cylinder hydrostatic test date to ensure it is current (within three years for fiberglass wrap and five years for metal or carbon fiber composite cylinders).

4. If the test date is greater than three years, immediately replace the cylinder with a new cylinder and return the expired cylinder to the mask station.

5. Visually inspect the SCBA for the latest maintenance test (all Scott 4.5 SCBAs require a one year maintenance test conducted by the Hanford Fire Department).

6. If the SCBA does not have a current calibration date or is past due, remove from service and replace with a new unit, returning the expired unit to the mask station.

7. Visually inspect cylinder for dents or gouges in fiberglass wrapping.

8. Remove and return to the mask station any cylinders, which indicate exposure to high heat or flame (paint turned brown or black, decals charred or missing, gauge lens melted, or elastomeric bumper distorted).

9. Check that the cylinder pressure gauge indicates full or 90% full.

10. If the cylinder pressure is less than full, replace it with a fully charged cylinder.

NOTE: The only exception is for training purposes in non-hazardous, non-radiological conditions.

11. Ensure the reducer high-pressure hose coupling at the cylinder valve outlet is hand tightened.

12. Don protective gloves and eyewear.

13. Ensure purge valve is closed and attaché facepiece tester assembly. |

14. Slowly open the air cylinder valve by rotating the knob counterclockwise at least one full turn and ensure the Vibralert alarm actuates.
15. Verify no airflow is coming from the facepiece.
16. If airflow is heard perform the following:
 - a. Close the cylinder.
 - b. Bleed off air.
 - c. Disconnect hose coupling.
 - d. Remove and replace with new unit.
 - e. Return failed unit to the mask station.
17. Cycle purge knob twice and verify air freely flows from the regulator.
18. Close air cylinder.
19. Slowly bleed off air using the purge knob while watching the pressure indicator gauge and if Vibralert fails to alarm at 25% of gauge, remove the failed unit and replace with a new unit.
20. Remove the regulator from facepiece and re-bag the regulator.
21. Return the unit to its proper location within the facility.
22. Ensure the emergency SCBA storage cabinet has 3 Scott masks, one of each size should be available in the cabinet; replace any missing masks.
23. Complete the Record of Maintenance Card (Scott Aviation Part Number 98105-01) or comparable facility maintenance card. (7.1.2)
24. Close cabinet and replace the tamper proof seal on cabinet door handle.

4.11 Emergency/Immediately Dangerous to Life and Health Conditions (Excluding Fire Fighting)

See [Figure 8](#) for process flowchart.

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| Supervisors/Managers | <ol style="list-style-type: none"> 1. Ensure that emergency planning for work activities in areas which have the potential for becoming IDLH atmospheres is performed and complies with the requirements of 29 CFR 1910.134(g)(3).

NOTE: Emergency planning is provided in TFC-OPS-EP-C-01. 2. Ensure that emergency use respirators are quickly accessible when work is performed in areas that have the potential for becoming IDLH atmospheres. |
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| Industrial Hygienists/
Health Physicists | 3. Determine the appropriate respiratory protection to be used for emergency use and/or IDLH locations.

NOTE: The highest level of protection is required in an emergency since it will be assumed that the environment is IDLH until the situation can be further evaluated. |
| | 4. Ensure that a pressure demand or other positive pressure SCBA, or a pressure demand or other positive pressure supplied-air respirator with auxiliary self-contained air supply, is prescribed and provided. |
| Respirator Users | 5. Ensure you are qualified and know how to use the respiratory protection equipment supplied before conducting activities in an area that may require use of emergency respiratory protection.

6. Know where the emergency respiratory protection equipment is located. |

4.12 Atmosphere-Supplying Respirators/Compressor Use

See [Figure 9](#) for process flowchart.

- | | |
|---|--|
| Supervisors/Managers | 1. Ensure Industrial Hygiene evaluates the use of breathing air compressors and atmosphere-supplying respirator setups prior to their use (Attachment G).

2. Assign only qualified employees to perform work requiring the use of atmosphere-supplying respirators and/or operating a breathing air compressor or compressed air bottle cart. |
| Industrial Hygienists/
Health Physicists | 3. Evaluate the use of breathing air compressors and atmosphere-supplying respirators to ensure they are used in compliance with the requirements of 29 CFR 1910.134(I) (Attachment G).

4. Ensure certified lab results meet Grade D breathing air requirements.

5. Inform management of any problems or deficiencies pertaining to the use of the atmosphere-supplying respiratory equipment. |
| Respirator Wearers/
Cart Operators | 6. Follow the guidelines and processes described in Attachment G and Section 4.15. |

4.13 Voluntary Use of Respirators

(7.1.2)

See [Figure 10](#) for process flowchart.

Employees may voluntarily wear respirators when respiratory protection is not required if:

- They are currently medically qualified, fit tested (as applicable), and trained to use the respiratory protection equipment being requested

- They have reviewed [Attachment E](#) of this procedure
- They have reviewed [Attachment H](#) of this procedure.

Nuisance dust/odor filter masks are not subject to the controls in this section.

Voluntary respirator use may not be allowed when:

- SCBA use interferes with the function of required fall protection equipment
- Respirator use interferes with proper donning of required arc flash protection equipment
- When a safety, industrial hygiene, or health physics professional has determined that safety will be unacceptably compromised by voluntary respirator use.

Dissenting opinions on permissible voluntary respirator use will be resolved by the Vice President of Safety, Radiological Control and Quality Assurance or a delegate.

NOTE: All respirators must be checked out from an established mask issue station. Voluntary use of respirators is performed in accordance with the following steps.

- | | |
|--------------------|---|
| Respirator User | 1. Request voluntary respiratory protection. |
| | 2. Request voluntary respirator use/respiratory upgrade at a respirator issue station. |
| | 3. Review Attachments E & H of this procedure. |
| Respirator Issuers | 4. Validate respirator user has a current mask fit card for the respirator requested and that their respirator training is current. |
| | 5. Validate respirator user completes Respirator Equipment Sign In/Out Log (see Figure 5). |
| | 6. Don/doff SCBA/airline respirators in accordance with Attachment D. |

4.14 Evaluation of Respiratory Protection Program (7.1.2)

See [Figure 11](#) for process flowchart.

- | | |
|--|---|
| Safety and Health and Respiratory Protection Program Administrator | 1. Conduct evaluations of the work place to ensure that the respiratory protection program is being effectively implemented and that the program continues to be effective. |
|--|---|
- NOTE: A respiratory protection program evaluation checklist is provided in [Figure 12](#).

2. If subcontractor's develop and maintain their own respiratory protection program, evaluate the program and applicable procedures for regulatory compliance.

NOTE: The subcontractor respiratory protection program/procedure must address, at a minimum, the criteria listed in [Attachment H](#).

3. Regularly consult employees required to use respirators to assess the employees' views on the program's effectiveness and to identify any problems. Areas to be assessed must include the following:
 - Respirator fit (including the ability to use the respirator without interfering with effective work place performance)
 - Appropriate respirator selection for the hazards to which the employee is exposed
 - Proper respirator use under workplace conditions the employee encounters
 - Proper respirator maintenance.
4. Assist Operations/Projects in correcting problems identified during the assessments and/or programmatic deficiencies identified.

4.15 Use of Supplied Air Respirators

4.15.1 Breathing Air Cart Issuance and Control

Breathing air carts will be issued from established Issue stations.

- | | |
|-----------------------|---|
| Bottle Cart Issuer | <ol style="list-style-type: none"> 1. Ensure a Breathing Air Cart Sign In/Out Log (see Figure 13) is available for each cart in the Issue station inventory and that information specific to each cart is documented completely. 2. Ensure a POC is documented legibly in the Name Print/Sign block on the Breathing Air Cart Sign In/Out Log. 3. Ensure information pertaining to the cart issuance and return is completed documented on the Breathing Air Cart Sign In/Out Log. 4. Ensure the carts are returned to Fire Maintenance annually for required preventive maintenance. 5. Ensure carts are properly stored when not in use. |
| User/Point of Contact | <ol style="list-style-type: none"> 6. Maintain accountability for the location of all carts issued. 7. Notify the Issue station when the cart location documented on the Breathing Air Cart Sign In/Out Log changes. |

8. Keep the cart inside a structure or covered to minimize dirt and debris effects whenever the breathing cart is positioned at the work location but not in use.
9. Return breathing carts to the Issue station whenever a job has been completed or suspended for an extended period.

4.15.2 Breathing Air Cart Operation

Employees shall be qualified and trained on breathing air cart operation through Hammer training course #020047 and are to tend the breathing air cart at all times while the system is in use. The bottle cart operator is responsible for completing form (A-6004-341) prior to any entry. The user shall be allowed to review this process prior to attaching their airline equipment.

NOTE: The Industrial Safety and Health representative can provide a safety overview of the set up and use of all breathing air systems.

- Bottle Cart Operator
1. Prior to using a breathing air cart, check that:
 - a. Bottle cart cylinders are tagged appropriately as either full, in use, or empty.
 - b. All bottles on the cart are breathing-air certified (CGA Grade D Specifications).
 - c. Bottle cart is within its 12 month certification cycle (12 months after last inspection date).
 2. Determine if the bottle cart is an Air Systems or Hanford built bottle cart.
 - a. If the bottle cart is an Air Systems cart proceed to step 3.
 - b. If the bottle cart is a Hanford built cart proceed to step 4.
 3. Perform the following steps on the Air Systems bottle cart:
 - a. Bleed any remaining air pressure and turn the line pressure regulator counter clockwise.

NOTE: The Air Systems bottle cart uses and electronic alarm with a backup low pressure pneumatic alarm.
 - b. Turn on toggle switch to test electronic alarm.
 - 1) Replace the battery if the alarm fails.
 - 2) Repeat test with new battery.

NOTE: The electric alarm will sound when the cylinder is initially pressurized and will shut off when the pressure is above 300-500psi.

- c. Adjust the line pressure to 90-100 psi for use with SKA-PAK, SKA-PAK plus, or PremAire airline.
 - d. Shut off the cylinder valve and bleed off the air pressure slowly.
 - e. Check to see that the electronic alarm sounds at 300-500 psi and that the backup low pressure pneumatic whistle alarms at 200-500 psi.
 - f. Perform this test on both cylinders verifying that the full cylinder contains 1700-2200 psi and the in use cylinder contains at least 1000-2200 psi.
 - g. If the alarm fails to sound, check the equipment to ensure all parts are in good operating condition and repeat step 3e.
 - h. If the alarm still fails to sound at appropriate set points, return the bottle cart, obtain a new one, and go back to step 1.
 - i. Check to see that additional full (1700-2200 psi) breathing air cylinders are obtainable.
4. Perform the following steps on the Hanford built bottle cart:
- a. Bleed any remaining air pressure and turn the line pressure regulator counter clockwise.
- NOTE: The Hanford built bottle cart uses a low pressure pneumatic alarm.
- b. Slowly open cylinder valve on one cylinder and read the pressure on the high pressure gauge.
 - c. Adjust the line pressure to 90-100 psi.
 - d. Shut off the cylinder valve and bleed off the air pressure slowly.
 - e. Check that the alarm sounds at 300-500 psi.
 - f. If the alarm still fails to sound at appropriate set points, return the bottle cart, obtain a new one, and go back to step 1.
 - g. Verify the full cylinder contains 1700-2200 psi.
 - h. Verify the in use cylinder contains at least 1000-2200 psi.

Bottle Cart Operator/
User

5. Check equipment to ensure the following parts are present:
 - Air hose (not to exceed the manufacturer's recommended/NIOSH approved number of hose segments or maximum length. For Scott Supplied Air Systems equipped with Schrader fittings, a maximum of twelve, twenty five foot sections of hose for a maximum of 300 ft are approved)
 - Facepiece
 - Regulator
 - Harness Egress cylinder (within Hydrostatic test limits)
 - Additional full (1700-2200 psi) cylinders are obtainable and within hydrostatic test limits.

NOTE: Use of a single section of an air hose is recommended to eliminate the potential for accidental disconnection of hose-to-hose quick-connect fittings. When more than one section of an air hose must be used, accidental disconnection of intermediate connections should be prevented by removing obstructions from work area or protecting the connection using "yellow jacket" or other means to prevent contact with obstructions.

Bottle Cart Operator

6. Perform the following.
 - a. Plug in all the air lines to be used on the job.
 - b. Pull hard on each connection while turning it to be sure each is firmly seated.
 - c. Reserve one air line connection on the supply manifold or one unconnected air line hose for emergency or egress use only.
 - d. Open the valve on the cylinder to be used.
 - e. Regulate the pressure to 90-100 psi and check for leaks.
 - f. Listen, feel, and watch the line pressure regulator gauge (pressure must not drop).

User

7. Don equipment in accordance with Attachment D.

NOTE: Breathing should be normal. There should be little or no effort to breathe.

Bottle Cart Operator

8. If possible, switch to the full backup cylinder prior to the low pressure alarm sounding.

9. If the low-pressure alarm sounds (300-500 psi) while the system is in use:
 - a. Switch to full backup cylinder
 - b. Close valve on empty cylinder.
 - c. Have a new cylinder installed.
 - d. Valve in to replace the used cylinder within 15 minutes.
10. If the low-pressure alarm sounds while on the backup cylinder prior to change-out, notify personnel using the system to exit immediately.
- User 11. Doff equipment in accordance with Attachment D.
- Bottle Cart Operator 12. Leave all air lines connected to the manifold until all workers are out of the controlled area. Disconnect air lines ONLY AT THE PERSON first, never at the manifold, when exiting the controlled area.
13. Close the valve on the cylinder cart cylinder when the job is completed. Bleed air from the system and back off the line pressure regulator valve.
- User 14. During the progress of the job, if you have to turn on the 5-minute egress cylinder for any reason, immediately proceed out of the area where they would need a breathing air system. Do not reconnect and continue work until you get a new 5-minute egress cylinder.

5.0 DEFINITIONS

Air-purifying respirator. A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Atmosphere-supplying respirator. A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators and self-contained breathing apparatus.

End-of-service-life indicator. A warning system that identifies the end of service life for cartridges and canisters.

Filtering facepiece (dust mask). A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

High-efficiency particulate air filter. A filter that is at least 99.97% efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.

Immediately dangerous to life or health. An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere, and includes oxygen deficient atmosphere (oxygen content less than 19.5% by volume).

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Loose-fitting facepiece. A respiratory inlet covering that is designed to form a partial seal with the face.

Negative pressure respirator. A respirator in which the pressure inside the facepiece is less than the ambient air pressure outside the respirator, and includes air-purifying respirators, and supplied-air respirators, and SCBA operating in demand mode.

Positive pressure respirator. A respirator in which the pressure inside the facepiece exceeds the ambient air pressure outside the facepiece, and includes powered air-purifying respirators, and supplied air respirators, and SCBA operating in pressure demand mode.

Powered-air purifying respirator. An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the facepiece.

Qualitative fit test. An assessment of the adequacy of respirator fit by relying on the individual's response to a test agent (this is a pass or fail test).

Quantitative fit test. An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respirator cartridge shelf life. The amount of time a respirator cartridge, in its original factory packaging, can be stored so that it is not subjected to tampering, physical damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals prior to use. Respirator cartridge shelf life is measured from the receipt date or original manufacture date. Respirator cartridge shelf life shall be no longer than the shelf life recommended by the cartridge manufacturer.

Self-contained breathing apparatus. An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Supplied-air respirator. An atmosphere-supplied respirator for which the source of breathing air is not designed to be carried by the user (also known as an airline respirator).

Tight-fitting facepiece. A respiratory facepiece that forms a complete seal with the face, and includes half-face and full-face respirators.

User seal check. An action conducted by the respirator user to determine if the respirator is properly seated to the face.

6.0 RECORDS

The following records are generated during the performance of this procedure:

Record Description	Vital Record Y/N	QA Record Y/N	QA Record Retention L/NP/NA	NARA Retention Schedule	Other Retention Requirements	Records Custodian
Record of maintenance card (Scott Aviation Part Number 98105-01), or comparable facility maintenance card	N	Y	L	ADM-1.21.2d2	N	Respirator issuer
Respiratory Protection Program Evaluation Checklist.	N	Y	L	ADM-1.21.2d2	N	Safety and Health
Employee job task analysis	N	Y	L	ADM-1.21.2d2	TFC-ESHQ-S_IH-C-17	Industrial Hygiene
Training records	N	Y	L	ADM-1.21.2d2	TFC-BSM-TQ_MGT-C-04	Training Records Custodian

The identified records custodian is responsible for record retention retirement in accordance with [TFC-BSM-IRM_DC-C-02](#).

7.0 SOURCES

7.1 Requirements

- 10 CFR 851, Section 23, "Safety and Health Standards."
- 29 CFR 1910.134, "Respiratory Protection." (Contract)
 - 134(h)(1)(iii). (S/RID)
 - 134(h)(3)(i)(B). (S/RID)
 - 134(h)(3)(iv). (S/RID)
 - Appendix B-1
- 29 CFR 1926.103, "Respiratory Protection." (S/RID)
- ANSI Z88.2, "American National Standard for Respiratory Protection." (Contract)
- [TFC-PLN-55](#), "Industrial Hygiene Safety Management Program Plan."

7.2 References

- ANSI/CGA, "Commodity Specification for Air G-7.1."
- [TFC-BSM-IRM_DC-C-02](#), "Records Management."
- [TFC-BSM-TQ_MGT-C-04](#), "Training Records Administration."
- [TFC-ESHQ-Q_C-C-01](#), "Problem Evaluation Request."

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5. [TFC-ESHQ-S_IH-C-17](#), "Employee Job Task Analysis."
6. [TFC-ESHQ-S_IH-CD-05.1](#), "Respirator Issuance and Control Processes."
7. [TFC-ESHQ-S_IH-D-05.2](#), "3M Breathe Easy Powered Air Purifying Respirator Test and Maintenance."
8. [TFC-ESHQ-S_IH-D-05.3](#), "MSA OptimAir 6A Powered Air Purifying Respirator Test and Maintenance."
9. [TFC-ESHQ-S_SAF-C-02](#), "Job Hazard Analysis."
10. [TFC-OPS-EP-C-01](#), "Emergency Management."
11. [TFC-OPS-MAINT-C-01](#), "Tank Farm Contractor Work Control."
12. [TFC-OPS-MAINT-C-02](#), "Pre-Job Briefing."
13. [TO-100-052](#), "Perform Waste Generation, Segregation, Accumulation and Clean-up."

Figure 1. Purchase, Control, and Storage of Respirators.

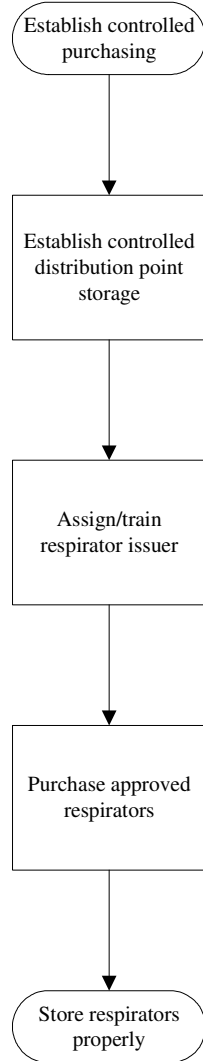


Figure 2. Medical Evaluations, Training, and Fit Tests.

NOTE: All three items must be accomplished for respirator user qualification.

1. Medical Evaluations



2. Training



3. Fit Tests



Respirator user is qualified

Figure 3. Exposure Assessment and Selection of Respirators.

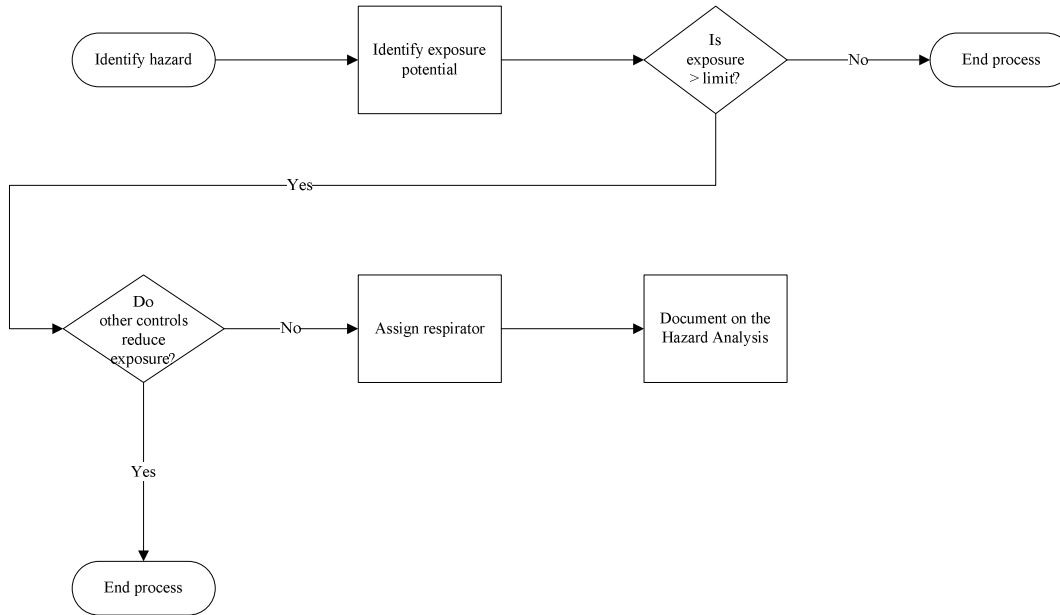


Figure 4. Issue, Use, and Return of Respirators.

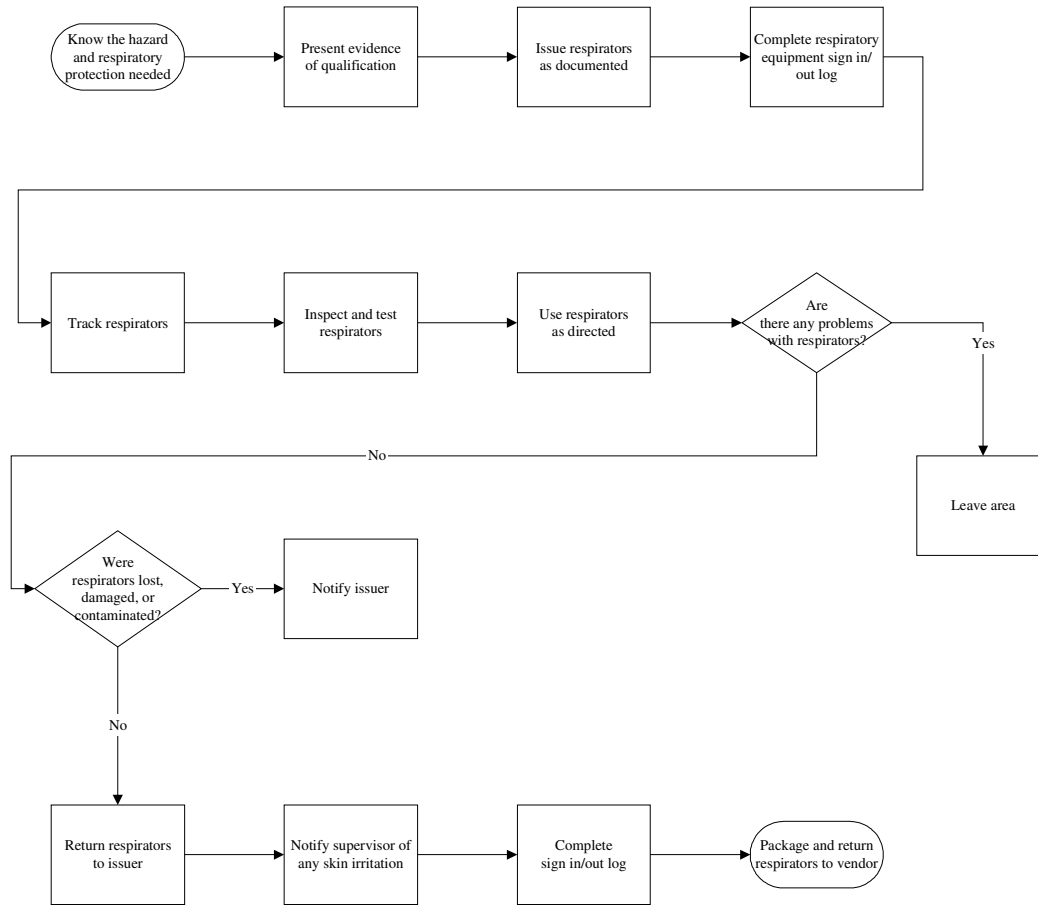


Figure 7. Monthly Inspections of SCBA (Emergency Use Respirators).

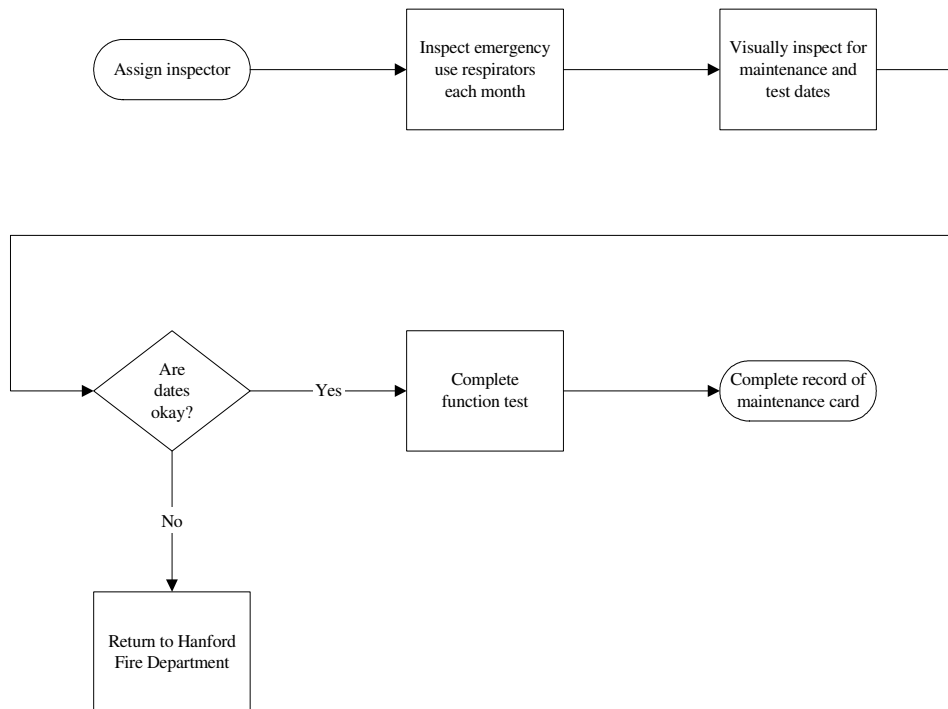


Figure 8. Respirator Use in IDLH Conditions.

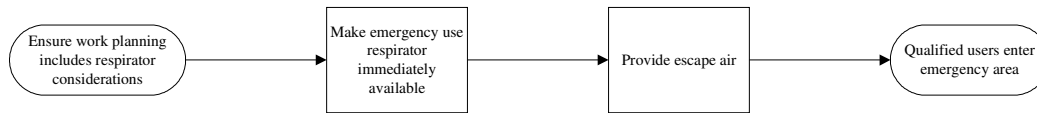


Figure 9. Atmosphere-Supplying Respirators/Compressed Air.



Figure 10. Voluntary Use of Respirators.

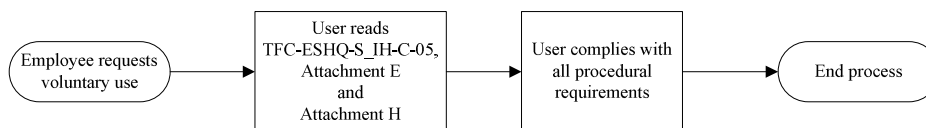


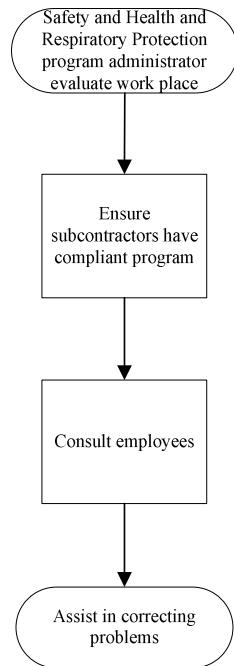
Figure 11. Evaluation of Respiratory Protection Program.

Figure 12. Respiratory Protection Program Evaluation Checklist.

Respiratory Protection		N/A	Complies	Does Not Comply
1.	The primary objective must be to prevent atmospheric contamination to control those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. (29 CFR 1910.134(a)(1))			
2.	Respirators must be provided when such equipment is necessary to protect employee health. (29 CFR 1910.134(a)(2))			
3.	In any work place where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, a written respiratory protection program must be developed and implemented that includes required work site specific procedures and elements for required respirator use. (29 CFR 1910.134(c))			
4.	Specific requirements must be met if respirators are used voluntarily. (29 CFR 1910.134(c)(2)).			
5.	The respiratory protection program must be administered by a qualified individual. (29 CFR 1910.134(c)(3))			
6.	Respirators, training, and medical evaluations must be provided at no cost to the employee. (29 CFR 1910.134(c)(4))			
7.	Respirator selection must be based on an evaluation of respiratory hazard(s) in the workplace and identification of relevant work place and user factors. (29 CFR 1910.134(d)(1))			
8.	Respirators with appropriate protection must be used in IDLH atmospheres. (29 CFR 1910.134(d)(2))			
9.	Respirators with appropriate protection must be used in atmospheres that are not IDLH. (29 CFR 1910.134(d)(3))			
10.	Minimum requirements for medication evaluation must be implemented to determine the employee's ability to use a respirator. (29 CFR 1910.134(e)(1)-(7)) NOTE: Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and work place conditions in which the respirator is used, and the medical status of the employee.			

Figure 12. Respiratory Protection Program Evaluation Checklist. (cont.)

Respiratory Protection		N/A	Complies	Does Not Comply
11.	Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. (29 CFR 1910.134(f)(1)-(8))			
12.	Procedures must be established and implemented for the proper use of respirators. (29 CFR 1910.134(g)(1)-(4)) NOTE: These requirements include prohibiting conditions that may result in facepiece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.			
13.	Accommodations must be provided for the cleaning and disinfecting of respirators used by employees. (29 CFR 1910.134(h)(1))			
14.	Accommodations must be provided for the storage of respirators used by employees. (29 CFR 1910.134(h)(2))			
15.	Accommodations must be provided for inspections of respirators used by employees. (29 CFR 1910.134(h)(3))			
16.	Accommodations must be provided for repairs of respirators used by employees. (29 CFR 1910.134(h)(4))			
17.	Employees using atmosphere-supplying respirators (supplied-air and self-contained breathing apparatus) must be provided with breathing gases of high purity. (29 CFR 1910.134(i)(1)-(9))			
18.	Filters, cartridges, and canisters must be identified with the appropriate NIOSH approval label. (29 CFR 1910.134(j))			
19.	Effective training must be provided to employees who are required to use respirators. (29 CFR 1910.134(k))			
20.	Work place evaluations must be conducted to ensure that the written respiratory protection program is being properly implemented. Employees must be consulted to ensure that they are using the respirators properly. (29 CFR 1910.134(l))			
21.	Written information regarding medical evaluations, fit testing, and the respirator program must be established and retained. This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA. (29 CFR 1910.134(m))			

Table 1. Respiratory Protection Issue Stations and Point of Contact.

Mask Issue Station Locations	Management Point of Contact/ Subject Matter Expert		
<u>Base Operations East</u> 278-AW/ 200 East	Field Crew Manager	(373-3056)	Deleted: WFO Issue Station
	Dayshift Support Manager	(373-3056)	
	<u>BOE</u> IH Manager	(372-3310)	Deleted: WFO
Waste Tank Sampling Station 2704-HV/ 200 East	Waste Tank Sampling Manager	(373-0259)	
NOTE: Air bottles and racks only			
<u>Base Operations West</u> Issue Station 2704-HV/ 200 East (First Floor South)	Field Crew Operations Manager	(373-9859)	Deleted: Closure
	<u>BOW</u> IH Manager	(373-2874)	Deleted: Closure Operations
WGI Issue Station	Construction Support Director	(372-0927)	
SY Tank Farm (next to MO-684)	WGI Project Manager	(943-8667)	
FFS Issue Station	Construction Support Director	(372-0927)	
MO-974/200 East (off Buffalo Ave.)	FFS Area Construction Manager	(376-2019)	
MO-523/200 East (SW of C-Farm)	FFS Area Construction Manager	(376-2019)	
MO-633/200 West (S Farm, north of MO-027)	FFS Area Construction Manager	(376-2019)	
	CH2M HILL Point of Contact: Retrieval Operations Project Manager	(373-0183)	
Painters Issue Station	<u>BOW</u> Maintenance		Deleted: Closure Operations
272-WA/ 200 West	Supervisor	(372-1723)	
242A Evaporator Issue Station 242A/200E	Evaporator Operations Manager	(373-4446)	
Key:			
<u>BOE</u> : Base Operations East			
<u>BOW</u> : Base Operations West			
FFS: Fluor Federal Services			
IH: Industrial Hygiene			
<u>WGI</u> : Washington Group International			Deleted: WFO: , Waste Feed Operations

ATTACHMENT A – PROTECTION FACTORS FOR RESPIRATORY PROTECTION
(7.1.4)

The TFC and its subcontractors will use 29 CFR 1910.134 as the overall basis for assigned protection factors for both radiological and chemical hazards. Any assigned protection factors for substance specific OSHA standards (such as asbestos and lead) shall be applied when more protective.

Table B-1. Assigned Protection Factor [From 29 CFR 1910.134]				
Type of Respirator	Respiratory Inlet Covering			
	Half Mask ^(a)		Full Facepiece	
Air-purifying	10		50	
Atmosphere-supplying				
SCBA (demand) ^(b)	10		50	
Airline (demand)	10		50	
Type of Respirator	Respiratory inlet covering			
	Half Mask	Full Face	Hood	Helmet/Loose-Fitting Facepiece
Powered air purifying	50	1000	1000 ^(c)	25 ^(c)
Atmosphere-supplying airline				
Pressure demand	50	1000	--	
Continuous flow	50	1000	1000	25
Self-contained breathing apparatus				
Pressure demand	--	10,000 ^(d)	--	--
Open/closed circuit				

^(a) Includes half masks with elastomeric face pieces.

^(b) Demand SCBA shall not be used for emergency situations such as fire fighting.

^(c) A protection factor of 1000 is assigned to MSA®¹, 3M®² hoods..

^(d) ^(e) A protection factor of 25 is assigned to the 3M General Purpose Headgear assembly.

NOTE: Assigned protection factors are not applicable for escape respirators. For combination respirators, e.g., airline respirators equipped with an air-purifying filter, the mode of operation in use will dictate the assigned protection factor to be applied.

¹ MSA is a registered trademark of Mine Safety and Appliances Company.

² 3M is a registered trademark of the 3M Corporation.

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ATTACHMENT B – DEFAULT CARTRIDGE OR CANISTER CHANGE-OUT SCHEDULES

When air purifying respirator use with gas/vapor cartridges is prescribed or allowed on a voluntary basis, and a respirator cartridge change-out schedule has not been established for a work activity by IH or Radiological Control, the following respirator cartridge or canister change-out schedule shall apply:

- For voluntary respirator use, the cartridge change-out schedule is once per shift (maximum 12 hrs)
- For use in air monitoring zones, the cartridge change-out schedule is once per shift (maximum 12 hours).
- For prescribed respirator use, the cartridge change out schedule is, at a minimum, twice per shift (maximum 6 hours).

ATTACHMENT C – GUIDELINES FOR ESTABLISHING CARTRIDGE OR CANISTER CHANGE-OUT SCHEDULES

1.0 PURPOSE

These guidelines are to assist the health and safety professional in developing cartridge or canister change-out schedules. The health and safety professional is responsible for determining if a cartridge or canister change-out schedule is needed and/or appropriate for activities using air-purifying respirators. Radiological conditions must be considered when determining the need or appropriateness of utilizing a change-out schedule.

The purpose of the change-out schedule is to ensure that air-purifying respirators are not used in situations where a chemical cartridge or canister becomes saturated such that the gas or vapor contaminant can break through the filters sorbent element and enter the respirator. For additional information on respirator cartridge or canister change-out schedules, see the OSHA website at http://www.osha-slc.gov/SLTC/respiratory_advisor/mainpage.html.

2.0 GENERAL INFORMATION

The OSHA respiratory protection standard requires a cartridge or canister change-out schedule be established and implemented when using an air-purifying respirator that does not have an end-of-service-life indicator, certified by NIOSH, for the contaminant being guarded against. The change-out schedule must be based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. Several factors can influence the service life of a cartridge or canister and must be considered when establishing a change-out schedule.

Following is a partial list of factors that can influence the service life of a cartridge or canister, followed by established rules of thumb:

- Contaminants chemical properties - for chemicals with boiling points greater than 70°C and a concentration less than 200 ppm, a service life of 8 hours at normal work rate can be expected (OSHA has not approved this rule and, therefore, should not be used as the primary determining factor)
- Contaminants concentration - reducing the concentration by a factor of 10 increases service life by factor of 5
- Temperature - high temperatures can directly affect the performance of the activated carbon filters
- Humidity - humidity greater than 85% reduces service life by 50%
- Work rate (breathing rate) of the respirator user - service life is inversely proportional to work rate

**ATTACHMENT C – GUIDELINES FOR ESTABLISHING CARTRIDGE OR CANISTER
CHANGE-OUT SCHEDULES (cont.)**

- Variability of respirator cartridges between manufacturers
- Presence of multiple contaminants (see section below on change-out schedule for multiple contaminants).

3.0 DEVELOPING CHANGE-OUT SCHEDULES

Cartridge or canister change-out schedules must be developed by an industrial hygienist using reliable information on the service life of the cartridge or canister. Since numerous influencing factors must be considered, the health and safety professional must take a conservative approach in developing change-out schedules by basing the schedule on worst-case conditions found in the work place. Use of warning properties as the sole basis for determining change-out schedules is prohibited. Information to be used to establish the change-out schedule may include breakthrough test data, recommendations from respirator manufacturers or chemical suppliers, or substance-specific change-out schedules developed by OSHA.

3.1 Breakthrough Test Data

A health and safety professional shall determine if there is objective breakthrough test data available for the make and model of respirator cartridge or canister to be used and whether the test data is sufficient to develop the change-out schedule. Sources of breakthrough test data include:

- Respiratory manufacturers objective data – see MSA web site at <http://www.msanet.com/msanorthamerica/msaunitedstates/resptest/index.html>
- Experimental breakthrough-time data from industry organizations, trade associations, professional societies, academic institutes, and laboratory tests
- Mathematical predictive modeling – refer to OSHA “The Advisor Genius” at web site http://www.osha-slc.gov/SLTC/respiratory_advisor/change_schedule.html.

3.2 Recommendations from Respiratory Manufacturers or Chemical Suppliers

If breakthrough data are not available, the health and safety professional shall seek other information on which to base a reliable cartridge or canister change-out schedule. The most readily available alternative is recommendations from the respirator manufacturer or chemical suppliers. To be reliable, such recommendations shall consider workplace-specific influencing factors (i.e., temperature, humidity, radiological conditions) that are likely to affect cartridge or canister service life.

**ATTACHMENT C – GUIDELINES FOR ESTABLISHING CARTRIDGE OR CANISTER
CHANGE-OUT SCHEDULES (cont.)**

3.3 OSHA Substance-Specific Change-Out Schedules

OSHA has already developed change-out schedules in the following substance-specific standards:

<u>Contaminant</u>	<u>Standard Reference</u>
Acrylonitrile	1910.1045(h)(2)(ii)
Benzene	1910.1028(g)(2)(ii)
Butadiene	1910.1051(h)(2)(ii)
Formaldehyde	1910.1048(g)(2)(ii)
Vinyl Chloride	1910.1017(g)(3)(ii)
Methylene Chloride	1910.1052(g)(2)(ii)

3.4 Analogous Chemical Structures

When breakthrough test data or other information are not available for the contaminant under evaluation, the health and safety professional may rely on service life values from other chemicals having analogous chemical structures. In some cases, a chemical with known migration may reasonably be anticipated to act as a surrogate for a similar chemical that would have less rapid migration. The health and safety professional could assume that a heavier, less volatile compound than another in the same chemical series that had been tested for breakthrough would break through no faster than the latter compound, such as benzene versus toluene. This method may be used as long as objective data or information for lower molecular weight compounds is used to predict the breakthrough times for higher molecular weight analogues containing only additional methyl or phenyl groups. Data from higher molecular weight groups should not be used to predict the behavior of analogous substances with lower molecular weight. This approach relies heavily on experimental data and expert analysis. This method may be less accurate than others and should be used only when better information is not available.

3.5 Multiple Contaminants (Mixtures)

Establishing cartridge or canister service life for mixtures of contaminants is a complex task and one that requires considerable professional judgment to create a reasonable change-out schedule. The change-out schedule for a mixture should be based on reasonable assumptions that include a margin of safety. Where the individual compounds in the mixture have similar breakthrough times (within one order of magnitude), service life of the cartridge should be established, assuming the mixture stream behaves as a pure system of the most rapidly migrating component or compound with the shortest breakthrough time (sum of the concentration of the components). Where the individual compounds in the mixture vary by 2 orders of magnitude or greater, the service life may be based on the contaminant with the shortest breakthrough time.

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ATTACHMENT C – GUIDELINES FOR ESTABLISHING CARTRIDGE OR CANISTER CHANGE-OUT SCHEDULES (cont.)

3.6 Chemical Contaminant Migration

Some contaminants have a tendency to migrate through cartridge or canister sorbent material during periods of storage or non-use. This is characteristic of the contaminant-carbon bed interaction for organic chemicals with boiling points below 65°C and would predictably shorten breakthrough times. In cases where respirators are used for multiple days, this could present an additional exposure to the respirator user. Where contaminant migration is possible, respirator cartridges or canisters should be changed after every work shift where exposure occurs unless specific objective data to the contrary (desorption studies) shows the performance of the cartridge in the condition and schedule of use and non-use found in the work place.

4.0 IMPLEMENTING THE CHANGE-OUT SCHEDULE

The health and safety professional shall provide the change-out schedule and document the information relied upon (summary of objective data or recommendations) for establishing the schedule in the work control document. Indicate on the hazard analysis documentation that adherence to a cartridge or canister change-out schedule is required. Include assumptions and additional requirements regarding influencing factors (i.e., ranges of heat and humidity, radiological conditions) in the documentation in order to make it clear under which conditions the change-out schedule is applicable. The health and safety professional may choose to include alternatives to the change-out schedule based on changing conditions (e.g., change out every four hours for concentrations up to 100 ppm, two hours for 200 ppm).

As appropriate, the documentation should include information about how the actual change-out or cartridges or canisters will take place, how often the change-out will occur, specific directions for change-out in radiological areas, and other information pertaining to the canister/cartridge change-out process and/or schedule.

ATTACHMENT D – DONNING AND DOFFING RESPIRATORS

SCBA/Carri-Air Donning Steps:

1. Close the purge valve.
2. Close the don/doff switch.
3. Open the cylinder valve.
4. Hold the regulator with the opening down.
5. Open the purge valve for two seconds, then close it.
6. Cycle the don/doff switch, ending in the closed position.
7. Inspect the regulator for moisture – immediately return any regulator with visible moisture to the issue station.
8. Attach the regulator to the facepiece.

Airline Donning Steps:

1. Close the purge valve.
2. Close the don/doff switch.
3. Attach the breathing air source.
4. Hold the regulator with the opening down.
5. Open the purge valve for two seconds, then close it.
6. Cycle the don/doff switch, ending in the closed position.
7. Inspect the regulator for moisture – immediately return any regulator with visible moisture to the issue station.
8. Attach the regulator to the facepiece.

SCBA/Carri-Air Doffing Steps:

1. Keep the air hose pressurized.
2. Keep the purge valve closed.
3. Close the don/doff switch
4. Remove the regulator from the respirator mask or the regulator and mask as one unit and then remove the regulator from the mask.
5. Shut off the tank valve.
6. Open the purge valve and bleed all the air out of the line.
7. Close the purge valve.
8. Do not reattach the regulator to the mask when returning the equipment to the issue station.

Airline Doffing Steps:

1. Keep the air hose pressurized.
2. Keep the purge valve closed.
3. Close the don/doff switch
4. Remove the regulator from the respirator mask or the regulator and mask as one unit and then remove the regulator from the mask.
5. Disconnect from the airline hose.
6. Do not reattach the regulator to the mask when returning the equipment to the issue station.

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ATTACHMENT E – USER SEAL CHECK DETAILS

(7.1.1.d)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Check

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. *Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedure

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

ATTACHMENT F – RESPIRATORY EQUIPMENT FAILURE ACTIONS

In an effort to prevent failures, the following actions will be taken to gather data on the failures and ensure the failed equipment is evaluated to determine the failure mechanism(s).

1. The field work supervisor will ensure the On-Call Safety Representative is notified.
2. The on-call safety representative, affected employee(s), and the field work supervisor will determine if the affected employee(s) can resume work with replacement equipment.
3. The field work supervisor will notify the on-duty shift manager of the nature of the equipment failure and the decision for affected employee(s) to resume work.
4. The field work supervisor will ensure failed equipment is segregated and identified as “out of service.”
5. The field work supervisor or shift manager and affected employee(s) will prepare a PER and attach a completed Respiratory Equipment Failure Questionnaire, included in this Attachment, to the PER. This action ensures the equipment will be evaluated by the fire department or applicable vendor to determine what may have caused the failure.
6. The on-call safety representative, in conjunction with the respiratory protection subject matter expert will determine any follow-on actions needed. This decision will be based on the type of failure, safety significance of the event, and the potential for similar failures.

ATTACHMENT F - RESPIRATORY EQUIPMENT FAILURE ACTIONS (cont.)

Respiratory Equipment Failure Questionnaire

Location of Event:
Job/Work Package:
Craft:
Serial harness #
Type of Mask:
Bottle type(60 or 30 minute):
Description of event:

How many bottles used:

In field working or changing bottle:

Air bottle pressure at time of event or as near after:

Ambient temperature outside:

Old harness or new harness:

Other atmospheric data (i.e. rain fog, snow etc.):

Position of air bottle valve:

Did they lose air:

Symptoms exhibited (continuous air flow, no air flow, erratic air flow):

Purge valve position:

Abnormal noises:

Did they have to remove mask to exit:

NOTE: Removal of respirator when in established VCZ will require evaluation at AMH for vapor exposure if symptoms are present or if medical evaluation is requested by the respirator wearer.

**ATTACHMENT G – CRITERIA AND GUIDELINES FOR ATMOSPHERE-SUPPLYING
RESPIRATORS/COMPRESSOR USE**
(7.1.1)

1. Employees using atmosphere-supplying respirators (supplied-air respirators and SCBA) must be provided breathing air, which meets at least Grade D quality, as specified by the Compressed Gas Association (CGA) "Commodity Specification for Air (G-7.1)." Breathing air, supplied by compressors, must be sampled by Industrial Hygiene at the time of initial compressor set-up, within six months of continuous use, or following maintenance or a system failure. Breathing air samples will be tested using NIOSH/ANSI/CGA established protocols.
2. Employees required to wear a respirator must not have facial hair that could interfere with the facepiece-to-face seal.
3. Compressor-supplied breathing air systems will be designed to provide a minimum flow rate of 113 L/min at 240kPa gage (4 scfm at 35 psig) for constant flow facepiece respirators and 170 L/min at 240kPa gage (6 scfm at 35 psig) for loose-fitting hoods and helmets. Demand type systems must be capable of delivering not less than 113 L/min (4 scfm) and not more than 425 L/min (15 scfm). Compressors and compressed breathing air systems must be tested and maintained per the manufacturer's instructions. Ensure that compressors are oriented away from air contaminants which may enter the compressor air intake.

NOTE: System design will take into account field conditions to ensure that minimum flow rates are achieved.

4. Compressed breathing air cylinders will be typically charged to 2200 psig; however, some compressor systems may rely on higher pressure cylinders as back-up air. Air from compressed air cylinders will be regulated to approximately 85 psig and supplied to the user via 1/2 to 3/8 inch hose.
5. Supplied air hose must be protected from ambient temperature extremes. All supplied breathing air hoses will contain Foster/Schrader™ quick disconnect fittings. Bottle cart manifolds will also require the use of Foster/Schrader™ quick disconnect fittings. Scott™ brand supplied air breathing hose using Foster/Schrader™ quick disconnect fittings will be limited to a maximum hose length of 300 feet.
6. Actions, activities, changes to employee personal protective equipment, or radiological contamination controls (sleeving) that alter the form/fit/function of a supplied air respirator are not permitted. It shall be demonstrated to the Respiratory Protection Program Administrator, or delegate, that any actions, activities, changes to personal protective equipment, or radiological contamination controls taken do not alter supplied air respirator form/fit/function prior to use of that respirator.
7. Breathing air compressors or compressed cylinder bottle carts must be manned at all times during supplied air respirator use.

**ATTACHMENT G – CRITERIA AND GUIDELINES FOR ATMOSPHERE-SUPPLYING
RESPIRATORS/COMPRESSOR USE (cont.)**

8. All personnel using an air line respirator MUST have the following:
 - Medical qualification
 - Training
 - Mask fit.
9. Supplied-air respirators are for use only in adequately ventilated areas containing at least 19.5% oxygen, unless equipped with escape provisions.
10. Supplied-air respirators should not be used when concentrations of contaminants are unknown or immediately dangerous to life or health, unless escape provisions are provided.
11. Never use compressed oxygen with supplied-air respirators.
12. The air delivered to the air line of supplied-air respirators must be respirable and of purity equal to at least Grade D breathing air as specified in the Compressed Gas Association's "Commodity Specification for Air (G-7.1)."
13. Supplied-air respirator hoses must be used only for approved (NIOSH) airline lengths.
14. If exposed to contaminants that can be absorbed through the skin, protective clothing must be worn.
15. Breathing air shall not be used for any purpose other than human consumption via a supplied-air respirator. Breathing air shall not be used to drive tools, equipment, or instruments.
16. Any person with a medical work restriction from the occupational medicine contractor stating he/she should not use a respirator shall not use this system.
17. Only those employees with the proper training may use and attend this equipment. Employee training shall include:
 - Proper donning, fitting, and pre-checking of equipment prior to entering a hazardous atmosphere
 - Inspection of work area for potential airline disconnection hazards
 - Continual vigilance to protect the equipment from abuse or neglect which may cause a malfunction
 - Hands-on equipment practice
 - Requirements of ANSI Z88.2. Training courses 020032 and 2R032 apply to this equipment.

**ATTACHMENT G – CRITERIA AND GUIDELINES FOR ATMOSPHERE-SUPPLYING
RESPIRATORS/COMPRESSOR USE (cont.)**

18. During the process of entry, if an employee becomes faint, has nausea, is dizzy, or shows other signs of becoming ill, abort that employee's entry immediately.
19. There must be a trained employee tending the bottle cart at all times while the system is in use.
20. An industrial hygienist will make the determination if an egress system is required (escape provision).
21. While donning SCBA, it is recommended that the buddy system be used.
22. The following provisions shall be made to minimize the potential for the SCBA unit freezing when freezing conditions exist:
 - a. Provide warming facilities to periodically warm the units.
 - b. Periodically remove residual moisture from the regulator and mask.
 - c. Limit the amount of time that the SCBA units are worn continuously without warming.
 - d. Providing extra units that can be changed out.
 - e. Prior to bottle change-out, ensure purge valve is opened to relieve pressure, then immediately shut to prevent moisture from getting into the air supply line.

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**ATTACHMENT H – INFORMATION FOR EMPLOYEES USING RESPIRATORS WHEN NOT
REQUIRED**
(7.1.1)

1. Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to ensure that the respirator itself does not present a hazard.
2. You should do the following:
 - Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
 - Choose respirators certified for use to protect against the contaminant of concern. The NIOSH of the U.S. Department of Health and Human Services certifies respirators. A label or statement of certification should appear on the respirator or respirator's packaging. It will tell you what the respirator is designed for and how much it will protect you.
 - Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
 - Keep track of your respirator so that you do not mistakenly use someone else's respirator.

ATTACHMENT I – TFC SUBCONTRACTOR’S RESPIRATORY PROTECTION PROGRAM

1.0 REQUIRED MINIMUM PROGRAM ELEMENTS

- Provide the name and qualifications of the program administrator responsible for overseeing the respiratory protection program (years and type of experience, training background, etc.).
- Describe medical evaluation requirements for respirator users.
- Describe training requirements of employees in the proper use of respirators and the respiratory hazards to which the employees will potentially be exposed to during routine and emergency situations.
- Describe fit testing requirements for respirator uses.
- Describe methods used in the respirator selection process, such as estimating exposure level. Provide types of respiratory protection to be used, if known.
- Describe the proper use of respirators in routine and reasonably foreseeable emergency situations.
- If air-purifying respirators will be used for protection against gases, vapors, or both, describe methods used to determine cartridge or canister change-out schedules.
- Describe respirator procedures to include respirator use, inspection, cleaning and disinfecting, storage, discarding, repair, and maintenance.
- If atmosphere-supplying respirators will be used, describe methods used in providing and maintaining adequate air quality, quantity, and flow.
- Describe process to allow employees to voluntarily use respirators when respiratory protection is not required.
- Describe methods to be used to evaluate the effectiveness of the respiratory protection program.

2.0 TFC SUBCONTRACTOR OVERSIGHT

- TFC Safety and Health will periodically conduct oversight surveillances of the subcontractor’s implementation of the requirements of the approved respiratory protection program.
- Only qualified subcontract personnel, approved by CH2M HILL Safety and Health, may prescribe respiratory protection equipment.
- Subcontract personnel may not wear respiratory protection until documentation of proper medical surveillance, mask fit, and training have been reviewed and approved by CH2M HILL Safety and Health.